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On the specific validity of *Chrysallida penchynati* (B.D.D., 1883) and description of *Chrysallida rinaldii* n. sp.

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KEYWORDS: *Chrysallida rinaldii*, *Chrysallida penchynati*, *Chrysallida multicostata*, new species, lectotype, Mediterranean Sea, recent, marine.

ABSTRACT The validity of *Chrysallida penchynati* (B.D.D., 1883) as a species is confirmed based on the study of the type material. The lectotype for the species is designated. A new species, *Chrysallida rinaldii* n. sp., from Marettimo Island (Sicily) is described. The new species has a wide distribution along the Italian coasts. The presence of *Chrysallida multicostata* (Jeffreys, 1884) in the Mediterranean Sea is recorded for the first time.

RIASSUNTO Sulla base dello studio del materiale tipico, viene riconosciuta la validità specifica di *C. penchynati* (B.D.D., 1883) della quale viene designato un lectotipo, conservato nel MNHN, e proveniente dalla località tipo di Port Vendres (vicino a Perpignan, sud Francia). La nuova specie *Chrysallida rinaldii* n. sp. viene descritta per l'isola di Marettimo (Is. Egadi, Sicilia), ma risulta avere un'ampia distribuzione lungo le coste italiane. *C. rinaldii* è morfologicamente simile a *C. penchynati* e condivide, con molte altre specie mediterranee, la presenza di un cordone spirale soprasuturale nei giri intermedi e di due cordoni spirali nell'ultimo giro. *C. rinaldii* differisce tuttavia da *C. penchynati* per le seguenti caratteristiche: i) la protoconca è più piccola in *C. penchynati* (260 µm contro i 300 µm di *C. rinaldii)* e presenta un solo giro (in *C. rinaldii* sono 1,25); ii) in *C. penchynati* i giri sono piatti o solo leggermente convessi, mentre in *C. rinaldii* i giri sono marcatamente convessi; iii) in *C. penchynati* le coste formano uno spigolo appena accennato in corrispondenza della sutura adapicale; iv) in *C. penchynati* le coste sono ortocline, meno numerose (20-22 sull'ultimo giro contro le 22-32 della nuova specie) e si estendono oltre la base; v) in *C. penchynati* i cordoni spirali sono più distanti e gli interspazi non presentano strie spirali. Viene inoltre segnalato il primo ritrovamento di *Chrysallida multicostata* (Jeffreys, 1884) in Mar Mediterraneo, limitatamente al Mare di Alboran. Precedentemente la specie era nota solo per la Mauritania ed il nord della Spagna. *C. multicostata* differisce da *C. interstincta* per le sue maggiori dimensioni (fino a 3 mm), un profilo grossolanamente conico ed un più alto numero di coste (30/40), che sono flessuose (con la forma di una "S" rovesciata) ed opistocline. Negli esemplari molto freschi la superficie della conchiglia è leggermente iridescente. Tutte queste caratteristiche differenziano anche *C. multicostata* da *C. rinaldii*.

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INTRODUCTION

Considerable progress has been made in the study of Mediterranean Pyramidellidae thanks to contributions from several European malacologists, especially in the last twenty years. The genus *Chrysallida* Carpenter, 1857 has been revised by Aartsen (1977), who included in this genus some groups of species that have been subsequently moved to more appropriate genera, like *Folinella* Dall & Bartsch, 1904, *Tragula* Monterosato, 1884 and *Odostomella* B.D.D., 1884. Other works, dealing mainly with Eastern Atlantic Chrysallidinae were: Aartsen & Carrozza (1979, 1983), Amati (1986), Aartsen, Barash & Carrozza (1989), Warén (1991, 1993), Aartsen & Giannuzzi Savelli (1991), Linden & Eikenboom (1992), Gaglini (1992), Micali, Nofroni & Aartsen (1993), Nofroni & Schander (1994), Schander (1994), Buzzurro & Nofroni (1995), Nofroni & Tringali (1995), Peñas, Templado & martinez (1996), Aartsen & Menkhorst (1996). The works of Peñas & Rolan (1998, 1999) and Aartsen *et al.* (2000) dealt with species from West Africa, that have often important correlations with Mediterranean counterparts.

Thanks to these contributions the identification of the Mediterranean species of *Chrysallida* is now easier. Exceptions are among the species with only two spiral ridges on the last whorl. This latter group includes well defined and easily identified species such as *C. emaciata* (Brusina, 1866), *C. flexuosa* (Monterosato, 1874), *C. moolenbeeki* Amati, 1987, *C. brattstroemi* Warén, 1991, but also some forms that may be interpreted as either phenotypes of *C. interstincta* (J. Adams, 1797) or valid species. The aim of the present work is to shed some light on this topic, by examining the type material of *Chrysallida penchynati* (B.D.D., 1883) and describing *Chrysallida rinaldii* n. sp. The binomen *C. interstincta* (J. Adams, 1797) is preferred to *C. obtusa* (Brown, 1827) as proposed by Warén (1991).

ABBREVIATIONS

MNHN: Museum National d'Histoire Naturelle, Paris (France)
ZMR: Zoological Museum, Rome (Italy)
NHML: Natural History Museum, London (GB)
SMNH: Swedish Museum of Natural History, Stockholm (Sweden)
APC: collection of A. Peñas, Vilanova I la Geltrù (Spain)
ERC: collection of E. Rinaldi, Forlì (Italy)
FSC: collection of F. Swinnen, Lommel (Belgium)
GTC: collection of L. Giunchi & M. Tisselli, S. Zaccaria (Ravenna, Italy)
INC: collection of I. Nofroni, Rome (Italy)
PMC: collection of P. Micali, Fano (Italy)
GFC: collection of G. Fasulo, Napoli (Italy)
PQC: collection of P. Quadri, Milan (Italy)
GBC: collection of G. Buzzurro, Monza (Italy)
h/D: height/diameter ratio of the shell
sh/s: shell/s

SYSTEMATICS

Order HETEROSTROPHA

Superfamily PYRAMIDELLOIDEA
family Pyramidellidae
subfamily Chrysallidinae

Chrysallida penchynati (B.D.D., 1883)

Material examined

Type material: the lectotype here selected (MNHN, not figured); two possible syntypes (ZMR nos. 23842, 23873).
Other material: Camogli (Genova), -42 m, 2 shs. (PMC); Portovenere (La Spezia), -15/25 m, 5 shs. (INC and PMC); Maddalena Island (Sardinia), -80 m, 1 sh. (INC); Giannutri Island (Tuscan Archipelago), -47 m, 43 shs. (INC); Giglio Island (Tuscan Archipelago), -27 m, 11 shs. (INC); Is. Ventotene (Lazio) -32 m, 1 sh. (PMC); Gulf of Naples -80 m, 5 shs. (PMC); Isola Bella (Mazzarò, Messina) –32 m, 14 shs. (PMC); Capo Zafferano (Palermo), -35 m, 2 shs. (INC).

Remarks

Aartsen (1977) examined some samples of *C. penchynati* in Dautzenberg's collection (Brussels) and stated: *"I am inclined to think that this is no more than a form of C. obtusa (Brown), which is a very variable species"*. This opinion was shared by Sabelli *et al.* (1990), while other Authors like Linden & Eikenboom (1992) and Peñas, Templado & Martinez (1996) considered *C. penchynati* as a valid species.
A syntype from Port Vendres (France) is stored in the MNHN with two labels handwritten by Philippe Dautzenberg. A third label, added more recently, bears the note *"SYNTYPE Fig."*. This specimen fits exactly the original description and drawing, and interpretation of this species given by Linden & Eikenboom (1992) and Peñas, Templado & Martinez (1996).
In the Monterosato collection (ZMR) there are two vials, each containing a single specimen. Both vials have original handwritten label by Dautzenberg. One of these possible syntypes (n° 23842) is certainly conspecific with the syntype preserved at MNHN and there are no doubts on its identification. The second specimen (n° 23873) was described and figured by Gaglini (1992) who considered it as a juvenile of *C. interstincta* and we agree on this interpretation.
Since the original material consists of two distinct species we consider it is opportune to select a lectotype to define the species identity. Therefore we designate the syntype stored in the MNHN as the lectotype and Port Vendres (near Perpignan, Southern France) as the type locality.
Chrysallida penchynati is similar to *C. interstincta*, but differs in some main morphological features. In *C. penchynati* the suture is incised, gradated, so that the profile appears turriculate and no whorl is wider than the start of the successive (as is found in some forms, mainly juveniles, of *C. interstincta*). The periphery is rounded, while in specimens of *C. interstincta* of the same size the periphery is angulated, an indication that they are immature specimens. *Chrysallida penchynati* has a columellar plica while *C. interstincta* has a columellar tooth. In *C. penchynati* the costae extend over the base, while in *C. interstincta* they stop at the periphery.
The protoconch of *C. penchynati* is elevated, rounded and without any sign of ombelicus, while in *C. interstincta* it is almost flat and slightly umbilicated. The protoconch of *C. penchynati* has a width of 260 µm, while in *C. interstincta* it measures about 300 µm. In the lectotype of *C. interstincta* figured by Warén (1991), the protoconch diameter is estimated to be about 300 µm, and this is the normal dimension for Mediterranean specimens. Fretter *et al.* (1986) indicate a diameter of 200-250 µm for specimens from Kattegat (between Denmark and Sweden), while in Peñas & Rolan (1998) a specimen from Ghana is figured whose protoconch diameter is estimated to be about 350 µm.

Chrysallida rinaldii n. sp.

Type material

Holotype (height mm 1.27): it is deposited in the malacological collection of the ZMR.
Paratypes: 1 sh. from type locality (MNHN); 1 sh. from type locality (NHML); 1 sh. from type locality (SMNH); 20 shs. from type locality (1 sh. PMC, 17 shs. INC, 1 sh. APC, 1 sh. GBC); 17 shs. from the Sicily Channel -70/150 m, maximum height 2.0 mm (12 shs. GTC, 4 shs. PMC, 1 sh. FSC); 12 shs. from Capraia Island (Tuscan Archipelago, Tyrrhenian Sea) -150 m, maximum height 1.37 mm (5 shs. ERC, 5 shs. PMC, 1 sh. INC, 1 sh. PQC); 1 sh. from Gulf of Naples -180 m, height 1.25 mm (PMC); 1 sh. from Gulf of Naples, Banco di mezzo, Stn. B52, -134 m (GFC); 1 sh. from Nerano (SA), – 50/55 m (GFC); 1 sh. from Central Adriatic Sea, - 90 m, height 1.37 mm (PMC).

Type locality and distribution

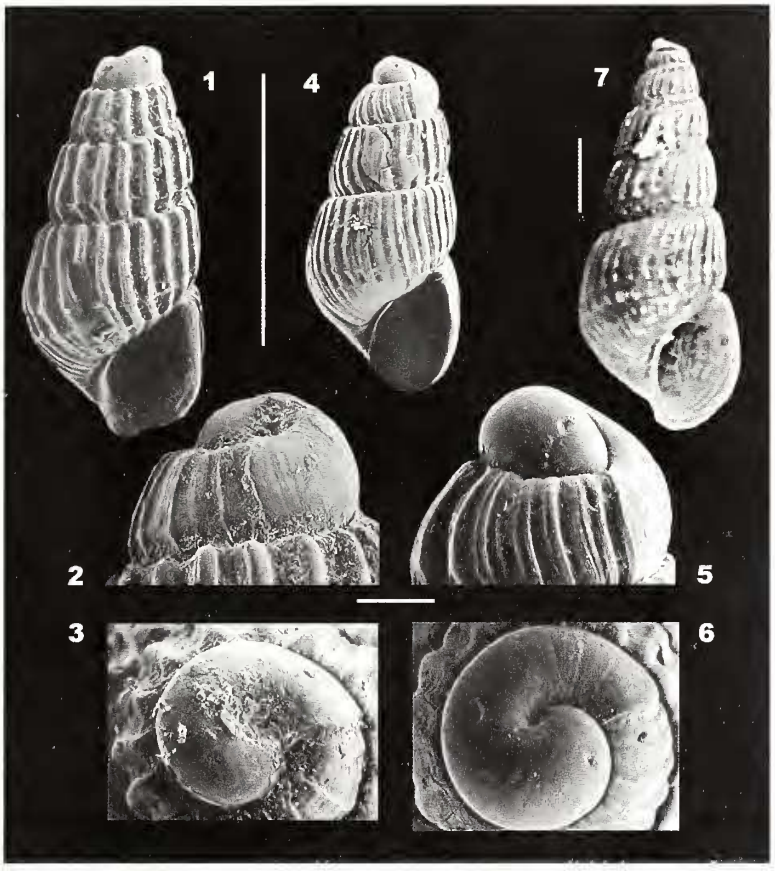
Type locality is designed Marettimo Island (Egadi Islands, Sicily, Italy). Shells have been found in samples of bioclastic sands collected at a depth of about 80-100 m. The new species appears widely distributed along the Italian coasts at a depth greater than 50 m.

Derivatio nominis

This species is named after Emidio Rinaldi (Forlì) in appreciation of his studies on the Adriatic malacofauna.

Description

The shell is of small size, pupoid and glossy. The protoconch is smooth, heterostrophic, with about 1.25 whorls, immerged in the teleoconch with an angle of about 135°. The protoconch diameter measures about 300 µm. The teleoconch has about 3 whorls, rather convex, separated by deep sutures, undulated by the margin of the costae. On the last whorl there are 22 to 32 costae, larger than the interspaces, slightly prosocline, straight or gently curved. In the interstices of the upper whorls there is a spiral ridge positioned just above the abapical suture, visible within the interspaces. The last whorl shows two spiral ridges, one at the suture and one just above. Costae extend over the base, where they became flattened, thinner and closer. At high magnification a spiral striature may be observed in the interspaces.
The last whorl occupies about 54% of the shell height and the aperture about 38%. The aperture is ear-shaped. The outer lip arises at the lower spiral ridge almost perpendicular to surface, then straightens to continue the profile of the spire. Below it is regularly



Figs 1-3 *Chrysallida penchynati* (B.D.D., 1883), Giannutri Island (Gr), - 47 m depth. Figs 4-6 *Chrysallida rinaldi* n. sp., holotype, type locality. Fig. 7 *Chrysallida multicostata* (Jeffreys, 1884), West Sahara, - 35 m depth. Scale bars: 1 mm (1, 4, 7) and 100 µm (2, 3, 5, 6).
Figg. 1-3 *Chrysallida penchynati* (B.D.D., 1883), Giannutri Island (Gr), 47 m di profondità. Figg. 4-6 *Chrysallida rinaldi* n. sp., olotipo dalla località tipo. Fig. 7 *Chrysallida multicostata* (Jeffreys, 1884), Sahara Occidentale, 35 m di profondità. Scala di riferimento: 1 mm (1, 4, 7) e 100 µm (2, 3, 5, 6).

curved and forms a right angle with the columellar lip. The parietal wall is covered by a thin callus. The columellar lip is arched with a slight thickening deep inside the throat, difficult to observe.
Dimensions: height 1.2 to 1.4 mm, width 0.55 to 0.65 mm, h/D about 2.15. Holotype: height 1.27 mm, width 0.59 mm.

Remarks

The species morphologically closest to *C. rinaldii* is *C. penchynati*. However, the sculpture of C. rinaldii (one spiral ridge on the upper whorls and two on the last whorl) is common to many other Mediterranean *Chrysallida*.
Chrysallida clathrata (Jeffreys, 1848) has one spiral ridge located in the middle of the whorl, while in *C. rinaldii* the ridge is located just above the abapical suture; *rinaldii* is furthermore of lesser size.
Chrysallida dollfusi (Kobelt, 1903) is a larger species: a specimen with three teleoconch whorls is approx. 1.9 mm high and 1 mm wide, while *C. rinaldii* is only 1.37 mm high and 0.6 mm wide. In addition protoconch is larger: 350 µm against 300 µm and profile is conical instead of pupoid.
Chrysallida emaciata (Brusina, 1866) has larger interspaces, about twice the costae, less numerous costae (approx. 20-22), deeper sutures, more convex whorls and a flatter protoconch.
Chrysallida flexuosa (Monterosato, 1874) has a much larger protoconch (375 µm against 300 µm), a truncated apex, flexuous costae which are fewer in number (18-20 against 22-32), flat whorls and has an umbilical chink.
Chrysallida intermixta (Monterosato, 1884) has larger interstices, about double of the costae, less costae (16-22 against 22-32), a more truncated profile and a smaller protoconch (250 µm against 300 µm).
We consider *Chrysallida limitum* (Brusina, 1876) as a possible form of *C. interstincta* endemic to the eastern Mediterranean Sea. However, *C. limitum* has more robust costae, fewer in number, a flat-concave whorl profile and is turriculated.
Chrysallida monterosatii (Clessin, 1900) has a conical-truncated profile with superficial sutures, the initial teleoconch whorls (one or two) are smooth or with obsolete costae. The protoconch is less prominent and the columellar fold is stronger.
Chrysallida moolenbeeki (Amati, 1987) has a very characteristic protoconch with four spiral ridges.
Chrysallida suturalis (Philippi, 1844) is conical in shape with a blunt apex, the sutures are less marked, the whorls flat or only slightly convex. H/D ratio ranges between 2.8 and 3.5. The protoconch is smaller (250 µm against 300 µm) and the apex is more truncated.
Chrysallida interstincta (J. Adams, 1797) is a polymorphic species with wide geographical and ecological ranges (from tide pools to bathyal mud) and many phenotypes. A form similar to *C. rinaldii* lives in relatively deep waters (100/200 m); about fifty shells have been examined from the Bonifacio Strait (between Sardinia and Corsica), the Adriatic Sea and the Eastern Sicily. As is normally the case when many individuals are examined there are shells with intermediate characteristics between this and the littoral form. Shells from the Central Adriatic Sea are the most similar to *C. rinaldii*, therefore the comparison has been made with specimens of *C. interstincta* found together with *C. rinaldii* in the Central Adriatic Sea (from a depth of around -90 m). *Chrysallida interstincta* differs from *C. rinaldii* in the following characteristics:
- the shell is conical with a blunt apex, more angulated base and h/D ratio of 1.75 vs. 2.15 for *C. rinaldii;*
- the protoconch is of the same diameter (300 µm) but wide and blunt, forming an angle of about 160° with the teleoconch axis, while for *C. rinaldii* the protoconch is more elevated and more tightly twisted, giving a pointed appearance to the shell;
- the costae end at the periphery while in *C. rinaldii* they extend over the base;
- the columellar lip is prominent, covering the umbilical groove, while in *C. rinaldii* there is no umbilical groove;
- there is a columellar tooth instead of plica.
Chrysallida penchynati differs from *C. rinaldii* due to the following characteristics:
- the protoconch is smaller (260 µm against 300 µm) with only one whorl instead of 1,25 whorls;
- the whorls are flat or slightly convex, while in *C. rinaldii* the whorls are well convex;

- the costae are slightly shouldered at the adapical suture;
- the costae are orthocline, less numerous (20-22 on the last whorl) and extend over the base;
- the spiral ridges are more distant and the interspaces do not have spiral striae.

Another species to compare with *C. rinaldii* is *C. multicostata* (Jeffreys, 1884). Type material of *C. multicostata* has not been found in Jeffreys's collection (Warén 1980: 38). Aartsen *et al.* (2000: 29, 30; fig. 34) designated as neotype a shell from Ria de Arousa (N of Vigo, Spain). This locality is not very far from Cabo de Sagres (West of Lagos, Portugal), which is the original type locality.

We report the presence of this species in the Alboran Sea for the first time, based on 1 sh. (1.5 mm) collected between Estepona (Spain) and Tetuan (Maroc), -25/35 m (INC) and 1 sh. (1.9 mm) from Calaburras (Malaga, Spain) at undetermined depth (INC). A shell from West Sahara, - 35 m depth (3.6 mm length) is here figured for comparison.

According to the previous and the new records this species seems to be distributed from Mauritania to northern Spain, with the Mediterranean presence limited to the Alboran Sea.

Chrysallida multicostata differs from *C. interstincta* due to its larger size (up to 3 mm), more broadly conical form and higher number (30/40) of ribs, which are opisthocline and flexuous (reversed-S shaped). In very fresh specimens the shell surface is slightly iridescent. All these characteristics also differentiate *C. multicostata* from *C. rinaldii.*

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